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may be assigned to a Sonoran origin. Nor is there one having keeled scales, except *Pityophis*, which appears to have inherited them from *Coluber*, and exhibits them now in weakness and instability indicating that they are being got rid of. I have shown elsewhere that hypapophyses and keeled scales are probably useful in swimming, to aquatic species. In both of these respects *Thamnophis* would be an anomaly among indigenous Sonoran genera, and its possession of both structures appears to be an argument of much weight on the side of its Austroriparian origin.

In matters of detailed taxonomy little need be said, especially when one admits the sway of the personal equation among specific characters. The author does present objections of some importance to the phylogenetic schemes devised by Professor Cope and the present reviewer, but it is to be remembered that the last of these, at least, was put forward as no more than a tentative hypothesis—a *ballon d'essai* as it were—and its author has no present inclination to make defense of all its details. But it must be said that parts of Dr. Ruthven's grouping are equally inadmissible. For instance, he combines with a long known Washington and Oregon form, *leptocephalus* (*ordinoides* in his nomenclature), garter snakes from the coast region of central California, usually recognized as *elegans*, which he excludes altogether from that portion of its range. This is not a happy conclusion, in view of the fact already recorded by me (*Proc. Academy of Nat. Sciences of Phila.*, 1903, p. 290), that I removed from the oviducts of a female from Santa Cruz Co., California, which would be, and indeed is assigned by Dr. Ruthven to *leptocephalus* (*ordinoides*), thirteen young, fully developed, twelve of which in color and scutellation are typical *elegans*, as defined by Baird and Girard. The snake to which Ruthven applies the name *elegans* is a species of the mountains and high plains properly known as *vagrans*.

Again, certain specimens of *elegans* from Santa Cruz Co. and neighboring portions of California, occur that are distinguishable with difficulty from *parietalis*, which Dr. Ruthven places on a quite different line of descent.

But I cheerfully turn away from fault-finding. The paper is admirably conceived, carefully executed, is original and fearless throughout, and systematic zoology would make large measure of gain if there were hope that it might serve as a finger-post to better methods in the study of variation. Here it deserves all praise.

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SCIENTIFIC JOURNALS AND ARTICLES

The American Naturalist for July contains the following articles "A New Mendelian Ratio and Several Types of Latency," by George H. Shull; "The Leg Tendons of Insects," by C. W. Woodworth, in which the author notes that the fact that the leg tendons are cuticular invaginations, and therefore subject to replacement at each molt, has not, so far as he is aware, been published. A case of "Abnormal Incisors of *Marmota monax*" is described by Charles A. Shull, and "A Note on the Coloration of *Plethodon cinereus*" is given by Hugh D. Reed, who describes two unusually red individuals. Marian E. Hubbard gives the results of "Some Experiments on the Order of Succession of the Somites of the Chick," which show that not more than two somites can arise in front of the one first formed. Hervey W. Shimer discusses "Dwarf Faunas," concluding that the chief agency in their production is an abnormal habitat. This might come about by change in a normal habitat or by the extension of an animal's range into an unfavorable location. In "Notes and Literature" Charles A. Kofoid gives a clear and interesting résumé of "The Life History of the Eel."

The Zoological Society Bulletin for July notes the birth of a mountain goat in the Park, the first born in captivity. The parents were two of a herd of five secured by Director Hornaday in 1905, and born in May of that year. There is an account of the present status of the park showing that it ranks first in number of individuals represented in the collections, there being 4,034 animals living in the park. Under the head

of "Interesting Animal Surgery" is noted an operation for cataract performed on the Indian rhinoceros, "Mogul." A Census of American Bison gives a total of only 2,047 on January 1, of which 969 were in captivity in the United States and 41 in Canada: these figures are now different owing to the sale to Canada of the Pablo herd. As a supplement to the bulletin F. A. Lucas has an article on "The Passing of the Whale," noting that the number of whales are being rapidly lessened and that unless protective measures are taken one or two species are in danger of actual extermination.

Bird-Lore for July-August contains articles on "The Fish Hawks of Gardiner's Island," by Frank M. Chapman; "The Return of the Snowy Heron," by Herbert R. Sass; "A Little Blue Heron Rookery," by M. Harry Moore, and the fifth paper on "The Migration of Flycatchers," by W. W. Cooke. The Educational Leaflet is by Mabel Osgood Wright and devoted to the tree swallow. The report on The Audubon Societies notes steady progress, but as the result of continuous work, and the vast numbers of birds sold for "plumes" shows the necessity of further hard work.

THE LIQUEFACTION OF HELIUM¹

In his communication to the Amsterdam Academy concerning the liquefaction of helium Professor Onnes describes in considerable detail the steps that led up to that achievement, the complicated apparatus employed, and the difficulties that had to be surmounted. The narrative conveys a vivid impression of the obstacles that have to be overcome in order to lower temperature a very few degrees in the neighborhood of the zero of absolute temperature. In spite of the most elaborate and comprehensive preparation and ample supplies of liquid hydrogen, not only was the whole apparatus, with its subsidiary arrangements, tested to its utmost capacity, but the physical energies of the professor and his assistants were well-nigh exhausted by the prolonged struggle.

The constants of helium, while showing

¹ From the *London Times*.

some important points of difference, are found to agree very remarkably with the predictions made by Dewar on theoretical grounds in his presidential address to the British Association in 1902. After a correction of two tenths of a degree the boiling point of the liquid is found to be 4.5 degrees Centigrade. By exhaustion to below one centimeter, and probably below seven millimeters of pressure, the professor considers that the temperature was reduced to about 3 degrees without, however, affecting the mobility of the liquid.

The density of the liquid helium is 0.15, or about double that of liquid hydrogen; and the proportion between the density of the vapor and that of the liquid is as 1 to 11. The critical pressure is in the neighborhood of two or three atmospheres, which is relatively low in comparison with the figures for other gases.

Professor Onnes deduces a critical temperature not much higher than 5 degrees Centigrade. But with regard to this and all the other figures he says that more careful measurements and calculations must be made before any certain and final conclusion can be reached. At temperatures so near to the absolute zero there is always room for doubt in the application of laws deduced from the behavior of bodies in more normal conditions, and for the present we must apparently be content to accept the values of the helium constants as provisional.

SPECIAL ARTICLES

A NEW GROUP OF PERMIAN AMPHIBIANS

MORE than thirty years ago the late Professor Cope described from the reputed Permian, of Illinois, three small vertebræ which he considered reptilian and which he made the type of the genus and species *Lysorophus tricarinatus*. Six years ago Professor Case recognized in certain material—a considerable series of connected and more or less intertwined vertebræ—which he had collected from the Permian of Texas, the same genus, and, possibly, the same species. He reached the conclusion that the animal was